

REMARKS

Request for an Examiner’s Interview

The Applicants and the Applicants’ attorney hereby request a telephone interview with the Examiner in order to expedite the prosecution of the present patent application.

Pending Claims:

Claims 1-12, 14, 16-23, 25, 27-32, and 34-35 are currently pending in the present application. Claims 13, 15, 24, 26, and 33 have been cancelled by the present Amendment and Response. Independent claims 1, 20, and 29 are amended by the present Amendment and Response. Upon entry of the present Amendment and Response, reconsideration of claims 1-12, 14, 16-23, 25, 27-32, and 34-35 is respectfully requested.

Rejections under 35 U.S.C. §102(e)

Claims 1-11, 13-22, 24-31 and 33-35 are rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent Number 6,985,020 to Zhou et al. (hereinafter “Zhou”). The Office Action states that the elements of independent claims 1, 20, and 29 are all disclosed in Zhou.

Independent claim 1 has been amended to recite the limitations in dependent claim 13 and 15, which are cancelled in this Amendment and Response. More specifically, independent claim 1 has been amended to recite that the laser is integral with and in close proximity to the pre-distortion circuit in a single device package.

Contrary to statements made in the Office Action that Zhou describes a laser that is integral with the pre-distortion circuit, the Applicants submit that Zhou describes only apparatus where the laser is in a physically separate device package from the pre-distortion circuit. For

example, Zhou FIG. 7 shows the laser circuit 340 including the laser diode 303 and the inductor 303 in a separate dashed-lined box, which indicates that the laser circuit 340 is in a physically separate device package from the pre-distortion circuit 300 device. The diodes D301 and D302 that produce the complimentary distortion signal and the bias and tuning components in the pre-distortion circuit 300 are shown outside of the dashed-lined box enclosing the laser circuit 340 indicating that they are in a physically separate package.

The laser and pre-distortion circuit described in Zhou, however, may be in the same transmitter housing. Locating the pre-distortion circuit 300 outside of the laser circuit 340 package in a transmitter as described in Zhou requires the transmitter designer to add the additional circuit components shown in FIG. 7, which match the phase and amplitude between the laser circuit 340 and the pre-distortion circuit 300. These additional circuit components are not necessary with the present invention.

One advantage of the claimed integrated laser device is that it does not need a temperature compensation circuit because the pre-distortion circuit is integrated together with the laser in the same package so that both the pre-distortion circuit and the laser experience the same temperature variations. Therefore, the temperature variations in the pre-distortion circuit and the temperature variations in the laser of the integrated laser device claimed in independent claim 1 substantially cancel out. A single temperature controller can be used with the integrated laser device claimed in independent claim 1 to control the temperature of both the pre-distortion circuit and the laser.

In contrast, Zhou describes using a pre-distortion circuit with temperature compensation. Referring to Zhou FIG. 7 and to the text beginning on column 6, Zhou describes that the

combination of resistor R305, resistor R307, and thermistor R306 combine to form the temperature compensation circuit 35. The Applicants submit that such a temperature compensation circuit is necessary in the apparatus described in Zhou because the pre-distortion circuit 300 is not integral with and in close proximity to the laser in a single device package as explicitly recited in independent claim 1. One aspect of the present invention is the discovery that such temperature compensation circuits are not necessary in the integrated laser device of the present invention.

Independent claim 1 has also been amended to recite that the laser has an electrical modulation input that is connected to the output of the pre-distortion circuit so that an input impedance of the electrical modulation input of the laser is substantially matched to an output impedance of the pre-distortion circuit. This amendment is supported by the specification of the present application. See, for example, paragraph 22 of the present specification.

Thus, one feature of the integrated laser device claimed in independent claim 1 is that the input impedance of the electrical modulation input of the laser is substantially matched to the output impedance of the pre-distortion circuit. As described in paragraph 22 of the present application, integrating the pre-distortion circuit with the modulated laser can eliminate the need for an equalization circuit and other interface components, such as impedance matching components.

In contrast, Zhou includes interface components that provide an impedance match between the pre-distortion circuit and the laser. Referring to Zhou FIG. 7 and to the text beginning on column 6, Zhou describes that inductor L301, capacitor C304, and match resistor R309 are used for impedance matching. The Applicants submit that such impedance matching

components are not necessary in the integrated laser device claimed in independent claim 1 because independent claim 1 explicitly recites that the input impedance of the electrical modulation input of the laser is substantially matched to an output impedance of the pre-distortion circuit.

To anticipate a claim under 35 U.S.C. §102, a single reference must teach every aspect of the claimed invention either explicitly or impliedly. Any feature not directly taught by the reference must be inherently present in the reference. Thus, a claim is anticipated by a reference only if each and every element of the claim is described, either expressly or inherently, in a single prior art reference.

Therefore, the Applicants submit that independent claim 1 is allowable over Zhou because Zhou does not describe the claimed integral laser device that includes a laser that is integral with and in close proximity to the pre-distortion circuit in a single device package. In addition, the Applicants submit that independent claim 1 is allowable over Zhou because Zhou does not describe an integral laser device where the input impedance of the electrical modulation input of the laser is substantially matched to an output impedance of the pre-distortion circuit. In addition, the Applicants submit that dependent claims 2-12, 14, and 16-19 are allowable as depending from an allowable base claim.

Similarly, independent claim 20 has been amended to include the limitations of dependent claim 24 and 26, which are cancelled in this Amendment and Response. More specifically, independent claim 20 has been amended to recite an optical source having reduced second-order and third-order distortions that includes a laser that is integral with and in close proximity to the pre-distortion circuit in a single device package. In addition, independent claim

20 has been amended to recite that the input impedance of the electrical modulation input of the laser is substantially matched to an output impedance of the pre-distortion circuit.

As described in connection with the rejection of independent claim 1, the Applicants submit that independent claim 20 is allowable over Zhou because Zhou does not describe the claimed optical source that includes a laser that is integral with and in close proximity to the pre-distortion circuit in a single device package. In addition, the Applicants submit that independent claim 20 is allowable over Zhou because Zhou does not describe the claimed optical source where the input impedance of the electrical modulation input of the laser is substantially matched to an output impedance of the pre-distortion circuit. The Applicants also submit that dependent claims 21-23, 25, 27-28 are allowable as depending from an allowable base claim.

Similarly, independent claim 29 has been amended to include the limitations of dependent claim 33, which is cancelled in this Amendment and Response. More specifically, independent claim 29 has been amended to include the step of propagating the pre-distorted modulation signal through a transmission line to a modulation input of a laser having an input impedance that is substantially matched to an output impedance of the non-linear circuit, where the transmission line substantially maintains an amplitude and a phase response of the pre-distorted modulation signal.

As described in connection with the rejection of independent claim 1, the Applicants submit that independent claim 29 is allowable over Zhou because Zhou does not describe propagating the pre-distorted modulation signal through a transmission line to a modulation input of a laser having an input impedance that is substantially matched to an output impedance of the

non-linear circuit. The Applicants also submit that dependent claims 30-32 and 34 are allowable as depending from an allowable base claim.

Rejection Under 35 U.S.C. §103

Dependent claims 12, 23, and 32 are rejected under 35 U.S.C. §103(a) as being unpatentable over Zhou in view of U.S. Patent No. 6,917,764 to Wilson (hereinafter “Wilson”). In view of the above amendments to independent claims 1, 20, and 29 and the arguments presented herein, the Applicant submit that dependent claims 12, 23, and 32 are allowable as depending from an allowable base claim.

CONCLUSION

Claims 1-12, 14, 16-23, 25, 27-32, and 34-35 are pending in the present application. Dependent claims 13, 15, 24, 26, and 33 have been canceled. Independent claims 1, 20, and 29 have been amended. The Applicants respectfully request reconsideration of the pending claims in light of the amendments and arguments presented in this Amendment and Response.

The Applicant’s Attorney has requested a telephonic interview to expedite prosecution of the present patent application. The Applicant’s Attorney welcomes the opportunity to discuss any outstanding issues, and to work with the Examiner toward placing the application in condition for allowance. Authorization to charge Attorney’s charge card for any other proper fees is given in the EFS-Web filing submission papers. However, if that authorization is insufficient, the Commissioner is hereby authorized to charge any proper fees to Attorney’s Deposit Account No. 501211.

Respectfully submitted,

Amendment and Response
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Serial No.: 10/710,881
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Date: November 26, 2007

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